REMARKS

Claims 2-11 and 13-21 are pending. No new matter has been added by way of the present amendments. For example, claims 2-4 and 13 have been amended to recite an "isolated nucleic acid" instead of a "gene." Claims 5-7, and 11 have been amended into independent format. The hybridization language of claims 2, 5, 6, 7, 11, and 13 now include wash conditions supported by Example 4 of the present specification at pages 27-28. The recitation of "capable of functioning" in claims 6, 7, and 11 has been changed to "that functions". Also, the elements in claims 6, 7, and 11 are defined as operably "linked." Claims 8-10 have been amended to recite a "host cell." Newly added claim 21 differs from claim 2 in that claim 21 adds the limitation of the nucleotide sequence of limitation (b) comprising 600 nucleotides. This subject matter is supported by the present specification at, for example, page 9, lines 2-7, page 9, lines 11-20, page 26, lines 9-12, and page 28, lines 9-15. That is, the present specification supports such a length of nucleotide sequence, such as in Example 2 and Example 4. Example 2 (see page 26, lines 9-12), describes preparing a probe. Example 4 describes hybridizing the probe of Example 2 to cDNAs determined to have the nucleotide sequences shown in SEQ ID NOs: 1 or 3. Further, Example 5 describes the nucleotide sequence of said cDNAs as having the sequence according to SEQ ID NOs: 1 or 3. Accordingly, no new matter has been added.

Applicants have attached hereto a marked up version of the

claims to show the changes made for the Examiner's convenience.

In view of the following remarks, Applicants respectfully request that the Examiner withdraw all rejections and allow the currently pending claims.

Objection to the Sequence Listing

At page 2 of the outstanding Office Action, the Examiner has noted an alleged discrepancy between the computer readable format of the sequence listing and the paper copy. Applicants traverse.

It appears as though the United States Patent and Trademark Office has not taken into consideration the paper copy of the substitute sequence listing filed on July 26, 1999 or the corresponding amendments to the specification. Accordingly, the USPTO is respectfully requested to correct their records in this regard.

Issues under 35 USC § 112, first paragraph

The Examiner has rejected claims 2, 5-11 and 13 under 35 U.S.C. § 112, first paragraph asserting that the described subject matter is allegedly not described by the specification. The Examiner has also rejected claims 2, 5-11 and 13 under 35 U.S.C. § 112, first paragraph asserting that the claimed subject matter is allegedly not enabled by the present specification. Applicants respectfully traverse each of the above rejections.

Applicants have amended the claims to clearly recite the

specific SEQ ID NOs, hybridization conditions and wash conditions set forth in the present specification. Consequently, Applicants respectfully submit that the present claims encompass subject matter which is adequately described and enabled.

At the Interview conducted on August 24, 2001, the Examiner requested that Applicants provide evidence showing that the hybridization conditions recited in the claims is highly stringent. Accordingly, attached hereto is an excerpt from Sambrook et al., Molecular Cloning: A LABORATORY MANUAL, SECOND EDITION, TABLE 11.1, pages 11.12 to 11.13.

In TABLE 11.1, highly stringent incubation and washing conditions sufficient for screening cDNA or genomic DNA libraries are described. The fact that such hybridization conditions were sufficient to screen cDNA or genomic DNA libraries is evidence that such hybridization conditions are highly stringent. Further, it is well known in the art that highly stringent conditions are generally utilized to screen such cDNA or genomic DNA libraries.

Comparing the conditions recited in TABLE 11.1 to those recited in the present claims, it is evident that the hybridization conditions of the present claims are also highly stringent. One of ordinary skill in the art understands that the salt concentrations and temperatures recited in the claims provide for incubation conditions that are at least analogously stringent to that provided in TABLE 11.1. In fact, the conditions of TABLE 11.1, having higher salt concentrations and lower temperatures are

less stringent than the conditions recited in the present claims. For instance, several conditions marked with asterisks in the attached TABLE 11.1 utilize hybridization conditions such as salt concentrations of 0.98M - 1.2M Na^+ and temperatures of 42°C-48°C. These are much less stringent than the presently recited salt concentration of 5x SSPE (salt concentration of 0.75M) and temperature of 65°C. That is, the present claims recite lower salt concentrations and higher temperatures than analogous conditions in TABLE 11.1. Accordingly, the present conditions are at least analogous to the highly stringent conditions of TABLE 11.1.

In view of the above, the Examiner is requested to withdraw all rejections under 35 USC § 112, first paragraph.

Issues under 35 USC § 112, second paragraph

The Examiner has made several rejections to the claims under 35 U.S.C. § 112, second paragraph. Applicants respectfully traverse each of these rejections.

The Examiner has rejected claim 2, lines 5-7 and claim 13, lines 7-9 asserting that without defined wash conditions, the claims are indefinite. The claims have been amended to recite wash conditions.

In claim 6, lines 2 and 4, claim 7, lines 3 and 5, and claim 11, lines 6 and 8, the Examiner has objected to the phrase

"capable of functioning". Applicants have followed the Examiner's suggestion and amended this phrase to recite "that functions".

The Examiner has rejected claim 6, line 5 and claim 11, line 9 asserting that after "operably", the word "linked" should be inserted. Applicants have adopted this suggestion in the claims.

The Examiner has rejected claim 8, line 1 asserting that the term "harboring" is indefinite and should be changed to "transformed" or "comprising". Applicants have amended claim 8 to recite "transformed".

The Examiner has rejected claim 9 asserting that "the host" lacks proper antecedent basis. Applicants have amended claim 9 to recite "host cell" as supported by claim 8 (upon which claim 9 depends).

The Examiner has rejected claim 11 asserting that the two method steps "introducing" and "transforming" are the same. The second method step of "transforming" has been deleted.

The Examiner has rejected claim 11, lines 2-3 and 4-5 asserting that the phrase "iron making use of mugineic acid compound" is indefinite. Applicants respectfully submit that mugineic acid compounds are produced by reactions catalyzed by nicotianamine aminotransferase, which mugineic acid compounds act to solubilize iron by forming a chelate complex with the iron. Thus, this claim language is fully definite.

The Examiner has rejected claim 11, line 11 asserting that

the phrase "plant derived" is indefinite. Applicants have amended this phrase to delete "derived".

The Examiner has noted that claim 13, first word should be capitalized. This has been corrected.

The Examiner points out that claim 13 appears to be dependent on a prior claim but no claim is recited. Claim 13 has been amended above to be properly dependent upon claim 11.

Lastly, the Examiner asserts that claim 13, line 2 which recites "the gene of the nicotianamine aminotransferase" lacks proper antecedent basis. However, since claim 13 is now properly dependent upon claim 11, this issue is moot.

Applicants submit that each of the Examiner's rejections under 35 USC § 112, second paragraph have been rendered moot. Reconsideration and withdrawal of these rejections are requested.

Issues under 35 USC § 101

The Examiner has rejected claims 2-4 under 35 U.S.C. § 101 asserting that the recitation of "a gene" is a product of nature and thus not patentable. Applicants traverse and submit that the claim language recites an "isolated" nucleic acid, thus, this rejection is moot. Reconsideration and withdrawal thereof are requested.

In view of the above remarks, Applicants respectfully submit that the present claims define allowable subject matter. Accordingly, the Examiner is respectfully requested to withdraw

all rejections and allow the currently pending claims.

Pursuant to the provisions of 37 C.F.R. §§ 1.17 and 1.136(a), the Applicants hereby petition for an extension of two (2) months to October 15, 2001 in which to file a reply to the Office Action. The required fee of $400.00 is enclosed herewith.

If the Examiner has any questions concerning this application, he is requested to contact the Craig A. McRobbie (#42,874) at the offices of Birch, Stewart, Kolasch & Birch, LLP.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. § 1.16 or under § 1.17; particularly, extension of time fees.

Respectfully submitted,

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Attachment: Version with Markings to Show Changes Made
Excerpt from Sambrook

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS:

The claims have been amended as follows:

2. (Thrice Amended) [A gene] An isolated nucleic acid comprising

(a) a nucleotide sequence encoding an amino acid sequence represented by SEQ ID NO: 2 or 4 and having nicotianamine aminotransferase activity, or

(b) a nucleotide sequence which hybridizes to the nucleotide sequence of (a), when incubated in a solution of 5 x Denhart's solution, 5x SSPE and 0.1% SDS at 65°C for 12 hours, washed once with 6x SSP at 65°C for 10 minutes and washed twice with 2x SSP, 0.1% SDS at 42°C for 10 minutes, said nucleotide sequence encoding an amino acid sequence having nicotianamine aminotransferase activity.

3. (Twice Amended) The isolated nucleic acid [gene] according to claim 2, which has a nucleotide sequence encoding the amino acid sequence represented by SEQ ID NO: 2 or 4.

4. (Twice Amended) The isolated nucleic acid [gene] according to claim 3, which has a nucleotide sequence represented

by SEQ ID NO: 1 or 3.

5. (Amended) A plasmid comprising a nucleic acid [the gene as defined in claim 2] comprising

(a) a nucleotide sequence encoding an amino acid sequence represented by SEQ ID NO: 2 or 4 and having nicotianamine aminotransferase activity, or

(b) a nucleotide sequence which hybridizes to the nucleotide sequence of (a), when incubated in a solution of 5 x Denhart's solution, 5x SSPE and 0.1% SDS at 65°C for 12 hours, washed once with 6x SSP at 65°C for 10 minutes and washed twice with 2x SSP, 0.1% SDS at 42°C for 10 minutes, said nucleotide sequence encoding an amino acid sequence having nicotianamine aminotransferase activity.

6. (Amended) An expression plasmid comprising:

(1) a promoter [capable of functioning] that functions in a host cell,

(2) a nucleic acid [the gene as defined in claim 2] comprising

(a) a nucleotide sequence encoding an amino acid sequence represented by SEQ ID NO: 2 or 4 and having nicotianamine aminotransferase activity, or

(b) a nucleotide sequence which hybridizes to the

nucleotide sequence of (a), when incubated in a solution of 5 x Denhart's solution, 5x SSPE and 0.1% SDS at 65°C for 12 hours, washed once with 6x SSP at 65°C for 10 minutes and washed twice with 2x SSP, 0.1% SDS at 42°C for 10 minutes, said nucleotide sequence encoding an amino acid sequence having nicotianamine aminotransferase activity, and

(3) a terminator [capable of functioning] that functions in a host cell, operably linked in the above described order.

7. (Amended) A process for constructing an expression plasmid, which comprises combining:

(1) a promoter [capable of functioning] that functions in a host cell,

(2) a nucleic acid [the gene as defined in claim 2] comprising

(a) a nucleotide sequence encoding an amino acid sequence represented by SEQ ID NO: 2 or 4 and having nicotianamine aminotransferase activity, or

(b) a nucleotide sequence which hybridizes to the nucleotide sequence of (a), when incubated in a solution of 5 x Denhart's solution, 5x SSPE and 0.1% SDS at 65°C for 12 hours, washed once with 6x SSP at 65°C for 10 minutes and washed twice with 2x SSP, 0.1% SDS at 42°C for 10 minutes, said nucleotide sequence encoding an amino acid sequence

having nicotianamine aminotransferase activity, and

(3) a terminator [capable of functioning] that functions in a host cell, operably linked in the above described order.

8. (Amended) A [transformant comprising a] host cell [harboring] transformed with the plasmid as defined in claim 5 or 6.

9. (Amended) The [transformant] host cell according to claim 8, wherein the host cell is a microorganism.

10. (Amended) The [transformant] host cell according to claim 8, wherein the host cell is a plant cell[,].

11. (Amended) A process for enhancing iron absorbing ability of a plant cell, which absorbs iron making use of mugineic acid compound, which process comprises

introducing into a plant cell which absorbs iron making use of mugineic acid compounds an expression plasmid formed by combining

(1) a promoter [capable of functioning] that functions in said cell,

(2) [a plant derived nicotianamine aminotransferase gene] a nucleic acid comprising

(a) a nucleotide sequence encoding an amino acid sequence represented by SEQ ID NO: 2 or 4 and having nicotianamine aminotransferase activity, or

(b) a nucleotide sequence which hybridizes to the nucleotide sequence of (a), when incubated in a solution of 5 x Denhart's solution, 5x SSPE and 0.1% SDS at 65°C for 12 hours, washed once with 6x SSP at 65°C for 10 minutes and washed twice with 2x SSP, 0.1% SDS at 42°C for 10 minutes, said nucleotide sequence encoding an amino acid sequence having nicotianamine aminotransferase activity, and

(3) a terminator [capable of functioning] that functions in said cell,

operably linked in the above described order [and transforming said cell].

13. (Amended) [the] The process according to claim 11, wherein the [gene] nucleic acid sequence of the nicotianamine aminotransferase comprises:

(a) a nucleotide sequence encoding an amino acid sequence represented by SEQ ID NO: 2 or 4 and having nicotianamine aminotransferase activity, or

(b) a nucleotide sequence which hybridizes to the nucleotide sequence of (a), when incubated in a solution of 5 x Denhart's solution, 5x SSPE and 0.1% SDS at 65°C for 12 hours, washed once

with 6x SSP at 65°C for 10 minutes and washed twice with 2x SSP, 0.1% SDS at 42°C for 10 minutes, said nucleotide sequence encoding an amino acid sequence having nicotianamine aminotransferase activity.

New claim 21 has been added.